



INTERNATIONAL CATS CONTESTS

COMPETENCE & APTITUDE TESTING SERVICES
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QUESTION BOOKLET



ICATS SCIENCE CONTEST 2019

**GRADE 9 & 10
(ADOLESCENTS)**

Time Allowed: 90 Mins
Maximum Marks: 90

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TOTAL QUESTIONS : 30 MCQS

INSTRUCTIONS

1. DON'T START ATTEMPTING THE PAPER UNTIL INSTRUCTED BY THE INVIGILATORS.
2. INSTRUCTIONS FROM THE EXAMINATION INVIGILATORS MUST BE CARRIED OUT PROMPTLY.
3. CAREFULLY RECHECK YOUR NAME, FATHER NAME, SCHOOL NAME, ADDRESS ETC AT THE BUBBLE SHEET / ANSWERSHEET.
4. RECORD ALL ANSWERS ON THE BUBBLE SHEET ONLY. SELECT BEST ANSWER FROM THE FOUR GIVEN OPTIONS AND MARK ONLY ONE OPTION IN EACH QUESTION.
5. USE BLUE / BLACK INK TO FILL UP THE CIRCLES FOR YOUR ANSWERS ON THE BUBBLE SHEET. USE OF LEAD PENCIL IS NOT ALLOWED.
6. USE OF ANY HELPING MATERIAL INCLUDING CELL PHONES AND ELECTRONIC DEVICES IS STRICTLY PROHIBITED.
7. EVERY CORRECT ANSWER EARNS THREE POINTS. THERE WOULD BE NEGATIVE MARKING. ONE POINT WOULD BE DEDUCTED FOR EVERY INCORRECT ANSWER.
8. CANDIDATES MAY NOT LEAVE THE EXAMINATION ROOM UNESCORTED FOR ANY REASON, AND THIS INCLUDES USING THE WASHROOM.
9. NO MATERIALS OR ELECTRONIC DEVICES SHALL BE BROUGHT INTO THE ROOM.
10. THERE ARE FIVE CATEGORIES OF THE CONTEST AS UNDER:
 - A. TODDLERS (GRADE 1 & 2)
 - B. KIDS (GRADE 3 & 4)
 - C. JUNIORS (GRADE 5 & 6)
 - D. JUVENILES (GRADE 7 & 8)
 - E. ADOLESCENTS (GRADE 9 & 10 / O-LEVELS)
11. ONLY REGISTERED STUDENTS CAN PARTICIPATE IN THE CONTEST.
12. NO CANDIDATE SHALL TAKE OUT OF THE HALL ANY ANSWER BOOK(S) OR PART OF AN ANSWER BOOK, WHETHER USED OR UNUSED, OR OTHER SUPPLIED MATERIAL.
13. IF A PARTICIPANT DOES NOT UNDERSTAND A WORD OR PHRASE ON THE EXAM PAPER, NEITHER EXAMINER NOR INVIGILATOR IS PERMITTED TO ANSWER.
14. FOR INFORMATION ABOUT UPCOMING CONTESTS OR PROVIDING VALUABLE FEEDBACK, PLEASE VISIT WWW.CATSCONTESTS.ORG
15. ANY ACADEMIC MISCONDUCT OR MALPRACTICE MUST BE REPORTED TO INTERNATIONAL CATS CONTESTS AT INFO@CATSCONTESTS.ORG

Q1. Some states require shoppers to pay a deposit on certain beverage containers made of plastic and glass. When shoppers return the containers, their deposits are returned to them. How is this system intended to help the environment?

- A** | It encourages people to buy products that do not have a deposit.
- B** | It reduces the amount of money shoppers actually spend.
- C** | It reduces the amount of plastics and glass put into landfills.
- D** | It forces manufacturers to reduce air pollution when they are making the containers.

Q2. Which of the following is true about the temperature of liquid water in a lake that has frozen over during the winter?

- A** | The coldest water can be found at the lake bottom.
- B** | The coldest water can be found at middle depths.
- C** | The warmest water can be found at the lake bottom.
- D** | The warmest water can be found at middle depths.

Read the information given below and answer the questions 3 through 8.

Bacteria can be categorized by how they respond, as indicated by reproduction and growth, to certain temperatures. They are grouped into four categories—psychrophiles, psychrotrophs, mesophiles, and thermophiles—based on their growth response to certain temperatures. Minimal growth temperature is the lowest point at which the bacteria will reproduce. Optimum growth point is the temperature at which the bacteria reproduce most efficiently. Maximum growth point is the very highest temperature to which the bacteria will respond, beyond which the bacteria will not reproduce at all. Table 1 lists the types of bacteria as well as the growth points for each. Table 2 represents a list of common bacteria and their growth points.

Table 1			
Growth points or ranges (°C)			
Classifications	Minimum	Optimum	Maximum
Psychrophile	below 0	10-15	below 20
Psychrotroph	0-5	15	30
Mesophile	5-25	18-45	30-50
Thermophile	25-45	50-60	60-90

Table 2			
Cardinal growth points (°C)			
Bacteria name	Minimum	Optimum	Maximum
Anoxybacillus flavithermus	30	60	72
Bacillus flavothermus	30	60	72
Clostridium perfringens	15	45	50
Escherichia coli	10	37	45
Listeria monocytogenes	1	34	45
Micrococcus cryophilus	0	15	30
Staphylococcus aureus	10	37	45
Streptococcus pyogenes	20	37	40
Streptococcus pneumoniae	25	37	42

Q3. The category of bacteria appearing the most frequently in Table 2 is:

A | psychrophile

B | psychrotroph

C | mesophile

D | thermophile

Q4. The type of bacteria found in Table 2 that does not fit exactly into any of the categories listed in Table 1 is:

A | Clostridium perfringens

C | Micrococcus cryophilus

B | Listeria monocytogenes

D | Streptococcus pneumoniae

Q5. Average human body temperature is 40°C. According to Table 2, which of the following bacteria would grow most successfully in the human body?

A | Anoxybacillus flavithermus

C | Escherichia coli

B | Clostridium perfringens

D | Listeria monocytogenes

Q6. A new bacteria was discovered by scientists. It reproduces best at 55°C and does not show any new growth if exposed to temperatures above 65°C. This bacteria can most likely be categorized as a:

A | psychrophile

B | psychrotroph

C | mesophile

D | thermophile

Q7. Based on the information in Table 2, which bacteria has the smallest growth range?

A | Listeria monocytogenes

C | Streptococcus pneumoniae

B | Micrococcus cryophilus

D | Streptococcus pyogenes

Q8. According to information provided in the passage, *Listeria monocytogenes* stop reporting at what temperature?

A | $>1^{\circ}\text{C}$, but $<10^{\circ}\text{C}$

B | $>10^{\circ}\text{C}$, but $<34^{\circ}\text{C}$

C | $>34^{\circ}\text{C}$, but $<45^{\circ}\text{C}$

D | $>45^{\circ}\text{C}$

Read the information given below and answer the questions 9 through 13.

Because fish live in water they are exposed to any bacteria that exist in the water. Table 1 lists the habitat choices of 7 species of fish in a local pond and the fish's ability to combat the effects of the bacteria found in the water.

Fish species	Relative ability to combat bacteria	Habitat	Exposure to waterborne bacteria
A	<0.2	Shallow water with plants	None
B	<0.3	Shallow water with no plants	Low
C	0.2	Shallow water with no plants	Low
D	0.3	Deep water with no plants	Moderate
E	0.4	Shallow water with plants	High
F	0.6	Shallow water with plants	High
G	1.3	Shallow water with plants	High

Figure 1 shows the percent of fish that survive to adulthood in the lab for the 7 species, after exposure to water with bacteria present or exposure to water with the bacteria removed.

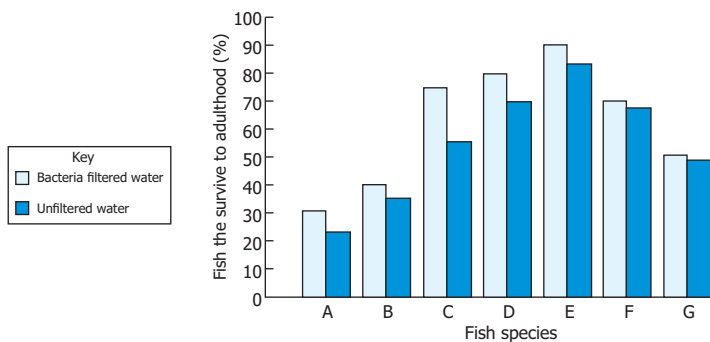


Figure 1

Figure 2 shows predicted bacteria levels over time in 4 geographic regions with fish populations.

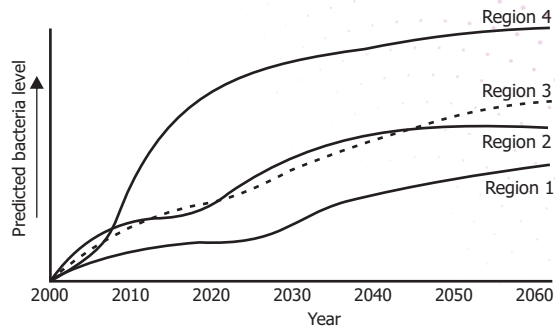


Figure 2

Q9. Based on the information in Figure 1, fish from which species are most likely to survive prolonged exposure to bacteria?

A | Species A

B | Species B

C | Species D

D | Species E

Q10. According to the data in Figure 1, which species showed the greatest difference between the percent of fish that survived to adulthood after exposure to unfiltered water, and the percent of fish that survived to adulthood after exposure to filtered water?

A | Species A

B | Species C

C | Species E

D | Species G

Q11. Researchers recently discovered a new species of fish that lives in deep water without plants. Based on the data in Table 1, the researchers would predict that this species' relative ability to combat bacteria is most likely:

A | high

B | moderate

C | low

D | nonexistent

Q12. According to the information in Table 1, for all the species shown, as the exposure to bacteria increases, the relative ability to combat the bacteria generally:

A | decreases only

B | increases only

C | decreases, then increases

D | increases, then decreases

Q13. Based on the data in Table 1 and Figure 1, fish that had the lowest percent of individuals survive to adulthood when exposed to bacteria tend to:

A | live in shallow water without plants

B | live in shallow water with plants

C | live in deep water without plants

D | live in deep water with plants

Q14. An engineering company is testing a new weather-forecasting program. Which procedure would best verify that the program is making accurate predictions?

A | comparing the predictions of the program to the actual weather

B | comparing the predictions of the program to other predictions

C | using the program to verify events not related to weather

D | using the program to verify past weather-related events

Q15. The illustrations show soccer balls of different masses being kicked with equal force. Which ball will have the greatest acceleration?

A



C



B



D



Q16. The distance from Earth to the Moon is approximately 384,000 km. If the distance were to increase to 500,000 km, which statement about the tides would be correct?

A | There would be no high tides or low tides.

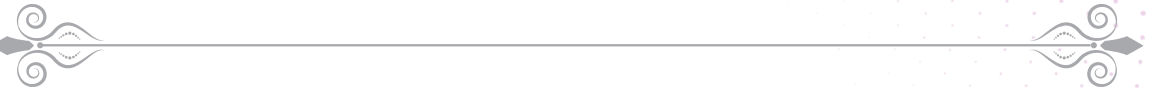
B | The difference between high and low tide would be much greater.

C | The difference between high and low tide would be much less.

D | The difference between high and low tide would not change.

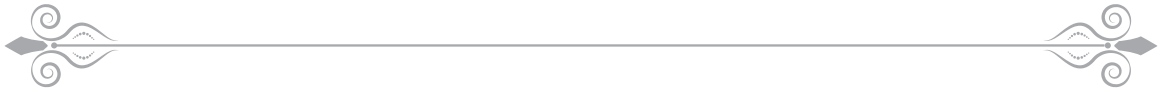
Q17. A tight metal lid on a glass jar of jelly may loosen when held under a flow of hot water. The hot water causes the

- A** | metal lid to contract.
- B** | metal lid to expand more than the glass jar expands.
- C** | glass jar to contract.
- D** | glass jar to expand more than the metal lid expands.



Q18. You need to dissolve 1 g of salt in 150 ml of water. After dissolving the salt in the water, you realize that you mistakenly used 175 ml of water. What can you do to correct this?

- A** | Pour out 25 ml of water.
- B** | Filter the water using a funnel and filter paper.
- C** | Wait for the salt to settle out of the solution.
- D** | Boil the water until only 150 ml remains.



Q19. The Arctic environment has temperatures that range between -22°C and 6°C with snow covering some of the area. Which adaptation would most likely help a population of organisms survive this environment?

- A** | long necks and tall legs
- B** | large shell and leathery skin
- C** | light colored fur and layers of blubber
- D** | brightly colored feathers and webbed feet

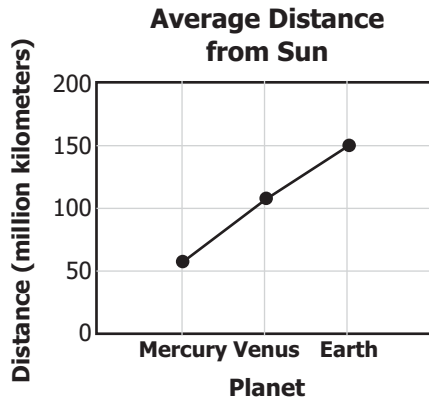
Q20. The table shows the average distance from the sun to the planets Mercury, Venus and Earth.

Average Distance from Sun

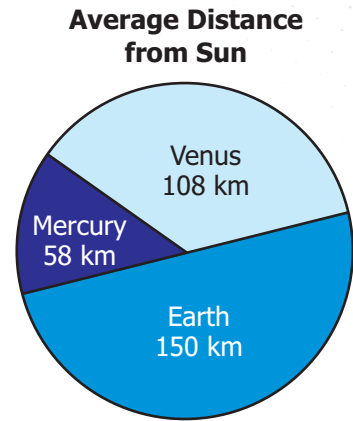
Planet	Millions of Kilometers (km)
Mercury	58
Venus	108
Earth	150

Which graph best compares the distance from the sun for these three planets?

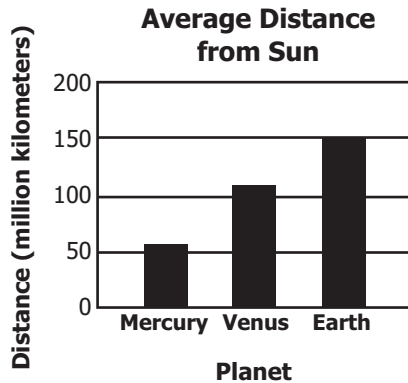
A



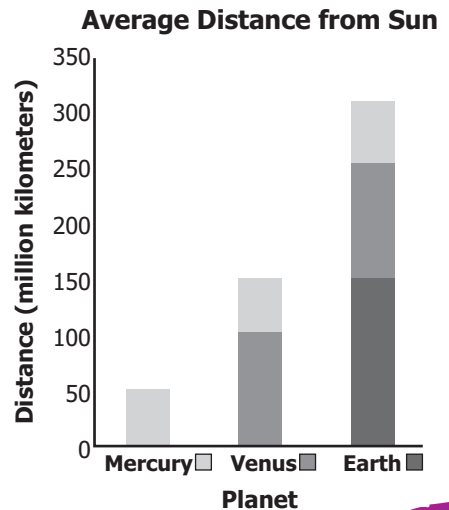
C



B



D



Q21. The procedure below is designed to test how water temperature affects the rate at which sugar dissolves.

- 1 Measure 150 milliliters of water into each beaker.
- 2 Heat water to three different temperatures.
- 3 Put 5 grams of sugar into each of the beakers at the same time.
- 4 Stir and record the time it takes for the sugar to completely dissolve.

Which additional step will most improve the investigation?

- A Use 200 milliliters of water in each beaker.
- B Record the initial and final temperatures of the water.
- C Stir at different rates for each beaker.
- D Record the times when sugar is half dissolved.

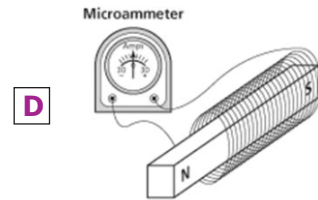
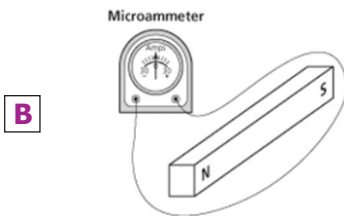
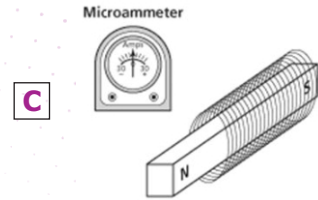
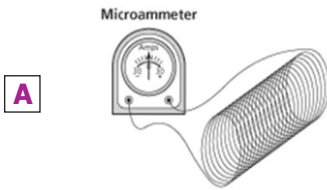
Q22. An iron block had an initial mass of 100 grams. As the block rusted, its mass increased. Which best explains why the mass increased?

- A Oxygen combines with iron when rust is formed.
- B Rust grows as it absorbs energy from the block.
- C Water is absorbed as rust forms on the iron block.
- D Rust releases heat and makes the iron expand.

Q23. Which procedure best represents the law of conservation of mass?

- A evaporating salt water leaves 5 grams of salt
- B burning 2 kilograms of wood leaves 0.4 kilogram of ash
- C using filter paper to separate 2 grams of solid from 10 grams of water
- D combining 2 grams of copper and 4 grams of sulfur to produce 6 grams of copper sulfate

Q24. Which diagram shows an apparatus that is correctly set up to produce and measure electricity?



Q25. A student asks why the ashes from a fire have a much lower mass than the wood that was burned. Which is the correct answer to the student's question?

A | Atoms in the wood are destroyed.

C | Water inside the wood solidifies.

B | Gases are released into the air.

D | Heat causes molecules to lose density.

Q26. A student recorded the speed of several blue cars versus several red cars over the course of 1 day. The average speed of red cars was 70 mph, while the average speed of blue cars was 68 mph. The student concludes that red paint makes cars go faster. Which statement identifies an error in the student's conclusion?

A | The conclusion was made based on two types of cars.

B | The observation was made on several highways.

C | The observation shows information for several times of day.

D | The conclusion claims that there is a cause and effect without evidence.

Q27. A student observes a tree with small needle-like leaves that stay green year round. Which conclusion can the student draw from the shape of the leaves?

- A | The leaves of the tree do not perform photosynthesis.
- B | The leaves of the tree have an illness that stunts their growth.
- C | The leaves of the tree are nonfunctional.
- D | The leaves of the tree are intended to reduce water loss.

Q28. Which statement best describes what the planet Saturn, a lizard, and a steaming kettle have in common?

- A | All are made of atoms.
- B | All are multicellular organisms.
- C | All are at the same internal temperature.
- D | All produce their own energy without help.

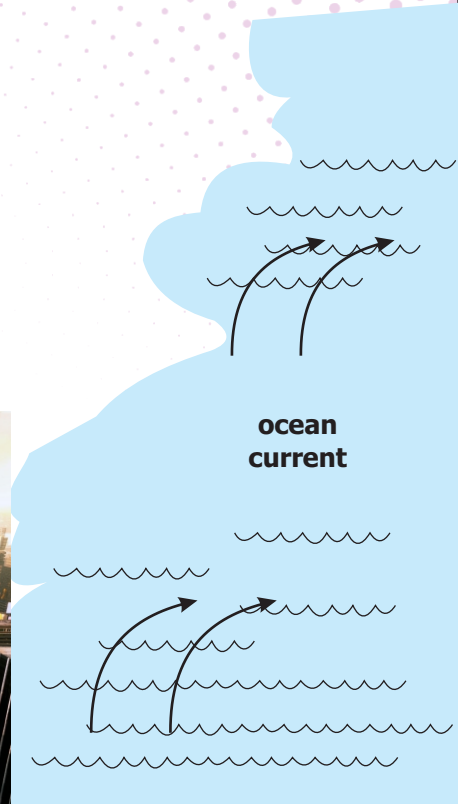
Q29. A 1,000-year old stone statue, in perfect condition, was moved from the desert to a park in New Jersey. After one year, its surface began to crumble. What is the most likely cause of the crumbling?

- A | The statue was very old and the stone started to decay.
- B | The statue was damaged by rain water.
- C | The statue was damaged during the move.
- D | The statue was damaged by sunlight.

Q30. Using the map shown below, answer the following question.



200km
X
Y



The average temperature of City X is hotter than the average temperature of City Y during the summer, but colder than City Y in the winter. Using the map shown below, what best explains the milder weather in City Y?

- A** | Warm winds from the land keep the temperature mild all year long.
- B** | The ocean current warms the air in winter and keeps it cooler in summer.
- C** | The ocean always floods City Y, keeping it near 75°F all year.
- D** | City Y is to the south of City X.

ICATS English Linguistics Contest 2019 National Toppers

Student Name	Father Name	Grade	School	City
AMATULLAH	ADNAN	1	MSB EDUCATIONAL INSTITUTE	KARACHI
MUHAMMAD MOHSIN	WAHEED SHEHZAD	1	RANGERS PUBLIC SCHOOL FOR BOYS	LAHORE
ZAIN-UL-ABIDIN	INAM-ULLAH	2	ARMY PUBLIC SCHOOL GARRISON JUNIOR	LAHORE
MUHAMMAD ASIS JAVED	MUHAMMAD SHAHEER JAVED	3	THE CITY SCHOOL CHASHMA BRANCH	MIANWALI
AYESHA SIDDIQUI	M. ASHRAF UL KABIR SIDDIQUI	4	THE CITY SCHOOL GULSHAN JUNIOR CAMPUS	KARACHI
AYESHA FAISAL	FAISAL EHSAN	5	LAHORE GRAMMAR SCHOOL LANDMARK PROJECT	LAHORE
ASAD IMRAN	M. IMRAN	6	THE CITY SCHOOL CANTT CAMPUS II	QUETTA
MANAAL TARIQ	DR. TARIQ MEHMOOD	7	THE CITY SCHOOL GIRLS CAMPUS	SIALKOT
FIZZA RIZVI	ALI ABBAS RIZVI	8	HABIB GIRLS SCHOOL	KARACHI
LAMISAH BEHRAM KHAN	BEHRAM BASHIR KHAN	9	LAHORE GRAMMAR SCHOOL	ISLAMABAD
FAIZ UL HASSAN GILANI	GHULAM UL HUSSAIN GILANI	10	THE CITY SCHOOL TOWN SENIOR SECTION	PESHAWAR

ICATS Mathematics Contest 2019 National Toppers

Student Name	Father Name	Grade	School	City
HIBA MALIK	BILAL MALIK	1	KOHSAR CHILDREN'S ACADEMY	MANSEHRA
DURYAB ZAHRA	MUHAMMAD RASHID	1	BEACONHOUSE HAFIZABAD	HAFIZABAD
ABDUL RASHEED	ABDUL WAHEED	2	ARMY PUBLIC SHOOOL & COLLEGE SYSTEM SADDAR CAMPUS	KARACHI
BURHANUDDIN	M. ALI ASGHER SAMIWALA	2	MSB EDUCATIONAL INSTITUTE	KARACHI
M. HUMMAS	M. SHAKIL	3	DEFENCE HOUSING AUTHORITY COLLEGE AND SCHOOL SYSTEM	KARACHI
EHAN QURESHI	ASSADULLAH QURESHI	4	FFC GRAMMAR SCHOOL AND COLLEGE	MIRPUR MATHELO
MAHAD ABID	M. HARIIS UMER	5	THE CITY SCHOOL CHENAB CAMPUS	FAISALABAD
UROOJ AJMAL	AJMAL IBRAHIM	6	KIPS SCHOOL	LAHORE
MUHAMMAD SALAMAT	SADAT MEHMOOD	7	GARRISON ACADEMY TUFAIL SHAHEED CAMPUS (SENIOR)	LAHORE
ABDULLAH JUNAID KHAN	ABDUL RAUF	8	THE SCIENCE SCHOOL	ISLAMABAD
SAAD ALI HASSAN	ABDUL HAYEE	8	THE SCIENCE SCHOOL	RAWALPINDI
DANIYAL KALEEM SHEIKH	MUHAMMAD KALEEM	9	ROOTS IVY INTERNATIONAL SCHOOL IB CAMPUS	RAWALPINDI
AHMED ALI	AUN ALI	10	MSB EDUCATIONAL INSTITUTE	KARACHI

COMPETE if you are
the **BEST**